[This Drawing is a reproduction of the Original on a reduced scale]

(1 SHEET.)

FIG. 1.

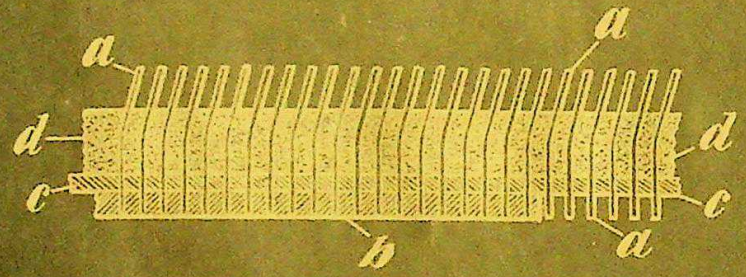


FIG. 2.

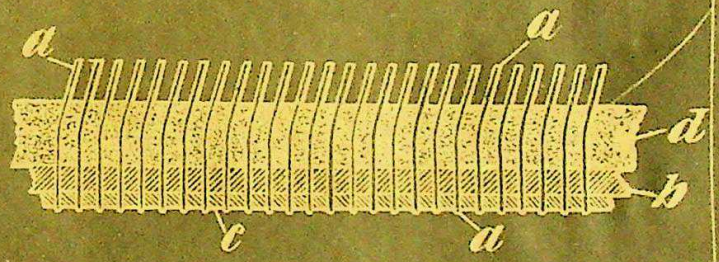


FIG. 3.

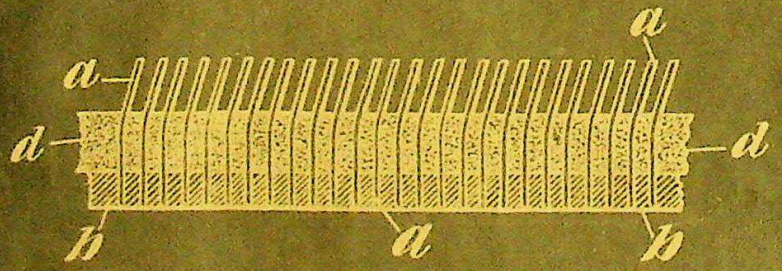
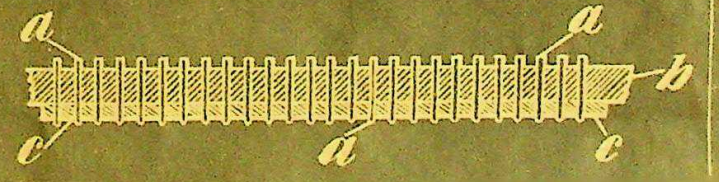


FIG. 4.



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CROKER'S Complete Specification.

Fig. 8.

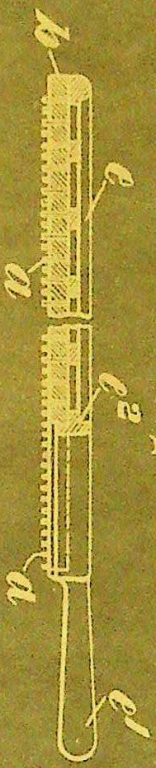

Fig. 7.

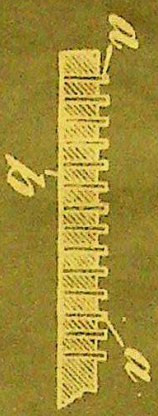

Fig. 5.

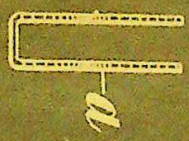

Fig. 6.

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COMPLETE SPECIFICATION.

A New Material and Articles of Manufacture applicable for or for Carding, Combing, Grinding, Abrading, Filing, and other Purposes.

I, GEORGE HENRY CROKER, of 18 Bellevue Road, Seacombe, in the County of Chester, Carver, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

According to this invention I produce a material or article, or articles, composed of teeth of steel or equivalent metal, and a backing or means of holding them, of metal, alloy, or hard substance, by which said points or nibs are firmly held and supported.

The teeth are disposed at short distances apart (and in the process of making the material or articles they may be held by any suitable material or means), while the metal or alloy in a molten state (or equivalent hard material such as vulcanite, ebonite, zylonite, gutta percha, and the like) is run in between and round them.

In combination, or in conjunction, with the metal (or equivalent hard substance), other material may be used, according to the purpose to which the invention is to be applied or used. Such a material may be of a soft nature.

The material or manufacture, or articles, according to this invention for carding or like purposes may consist of staples, nibs, or points, arranged as in ordinary cards, and held mainly by the backing of metal or alloy. And in conjunction therewith, a soft material such as is used in cards, may be employed.

Cards or carding material, according to this invention, may be employed for any of the various purposes to which ordinary cards or carding material is, or has been, proposed to be put, and to various kinds of machinery employing it.

The material may be used as a bed or surface on which substances or materials are operated upon, for the purposes of holding or detaining them, that is, to prevent them slipping or moving too fast when they are being operated upon by moving appliances or tools.

The material may be used as means for abrading, scratching, combing, or similarly treating substances.

The invention, according to a modification or application, is adapted to serve as a rasp or file, or in or as cutting tools. When adapted as a rasp or file, the metal backing will serve as the tooth holder ; whilst in other cases the teeth, held in their metallic backing material, may be fitted to a separate back, holder, or frame, having a handle if desired.

According to the purposes to which the invention is put, the teeth should be made stouter or finer, and they may be ground or made sharp in cases where it is desired.

Some suitable tooth holding metals (when metal is used) for the material or manufacture, are alloys, such as those known as "white metals," of suitable hardness, iron, steel, brass, copper, or alloys thereof, and others. In cases where metals or alloys of these natures are not wanted, or where they would not be suitable, ebonite, vulcanite, and analogous or equivalent substances may be run in round the teeth in a molten state, and be employed as the means or material for holding them.

From the foregoing it will be evident that this invention may be applied to a variety of purposes, and other than those specified ; and that it may be adapted or arranged to act as or serve for various articles of manufacture, and made in different ways.

In the drawings which serve to illustrate my invention I shew several examples, being modifications according to it.

Figure 1 is a section shewing material according to the invention.

Figure 2 is a section shewing a modification of same.

Figure 3 is a section shewing another modification.

Figure 4 is a section shewing a further modification; and

Figure 5 shews another modification.

Figure 6 shews one form of staple of which the teeth are made in some cases.

Figures 7 and 8 shew examples of the application of the invention to hand-files, rasps, or abraders.

The examples shewn in the drawings represent material which may be used as cards or carding material for use in various kinds of textile machinery, and in machines for acting upon granular and other substances, by rubbing or cleaning the outside surfaces of such granular and other substances, or removing adhering matter therefrom; and when of the required form and size, may be also used as or in brushes, files, and rasps, and other analogous abrading articles or material.

In the figures, *a* designates the teeth; *b* is the metal or other suitable hard material, which is run in round the teeth and forms their holder or support: *c* is the cloth or equivalent material shewn in some of the modifications: and *d* represents matted wool used in some of the modifications between the tips of the teeth, on the one hand, and the metal on the other. *e* denotes the backs or supports for holding the toothed material as or when applied to files or rasps.

For convenience of description I will assume the lamina *b* throughout to be metallic.

The material shewn in Figure 1 is carding material, according to this invention, such as may be used in carding machines and other textile machinery, and other machinery wherein cards or carding material is or may be used. In this form, the teeth *a* may be taken as of the construction and arrangement of ordinary carding material, namely, staples, set in the usual way, in the textile material *c*, *d*, whilst the metal *b* is at the back and holds the teeth from that part.

The modification shewn in Figure 2 illustrates a material substantially the same as that set forth with reference to Figure 1, but with the relative positions of the metal and cloth lamina *b* and *c* transposed in it, namely, the metal lamina *b* lies between the cloth *c* and the wool material *d*.

The material represented in Figure 3 is of the same nature as that set forth with reference to Figure 2 with the exception of the absence of the cloth lamina (*c*).

Figure 4 shews a material under this invention having the metal *b* nearest the tips of the teeth, and at the back a lamina of cloth or equivalent material *c*.

Figure 5 shews a modification wherein no cloth or other substance is used in connection with the metal *b*. This form or construction, and that shewn in Figure 4, are applicable for use in all kinds of machinery in which cards or carding material is employed for operating upon granular or other substances in the manner previously described, and wherein soft material above the backing and next the teeth tips is not required. It may also be used in hand (or machine) rasps and files, as in Figures 7 and 8, in which case it is fitted into a back *e* having a handle e^1 and dovetail edges e^2, the edges of the material being also correspondingly inclined so as to form a good dovetail fixing. Or, it may be made into the form of hand rasps and files without backs, in which case the teeth holding material should be a hard material such as iron, steel, brass, or the like, and provided with a tang cast on it; or a handle may be cast at the same time as the metal is run in round the teeth. In these cases the length of the teeth above the surface of the metal *b* should be short, say from about $\frac{1}{32}$nd to about $\frac{3}{16}$ths of an inch, more or

less, according to the thickness of the teeth and the work which they may be required to perform. Figure 7 shews a file or rasp having small or fine teeth, whilst Figure 8 shews one having coarser teeth. This construction could obviously also be used in machinery used for abrading substances.

These latter forms or constructions of toothed material are also suitable as a bed or beds or surfaces on which granular material may be operated upon, in the manner previously described, by moving parts by machinery, and serve to detain or retard its movement in the machine against the action of the moving part.

In any case the teeth may be straight or bent and set at any desired angle in the material in relation to the metal portion *b*.

The method of making the material or article consists in holding the teeth in the desired distances apart and then pouring molten metal (such as type metal or analogous alloys, lead, copper, brass, or other alloys, steel, iron or other suitable metals or equivalent hard substances) round and about the teeth and allowing it to set hard against them, whereby the metal *b* and teeth substantially become one structure. The operation will be performed in a mould or containing vessel adapted to obtain the metal lamina in the form required, and prevent its escaping. All this will be well understood to those skilled in the art of moulding, and founding metals.

The material may be produced in flat form, or in curved or bent form.

In the case of the material being of the form shewn in Figures 1 and 3, the carrying out of the method of making the material is effected by first taking a cloth lamina *c*, or soft material lamina *d*, or both of them, and putting (by hand or by suitable machinery) the teeth *a* into and through them, or either of them: then arranging said teeth in such lamina (which constitutes a support for the teeth in the process of manufacture) with their back ends standing or projecting out from the back lamina *c* or *d*, as the case may be: and then pouring molten metal round and in amongst those back projecting teeth ends and allowing it to set thereon. Type metal or the like is very suitable for carding material to be used in ordinary carding machines.

In the case of the material being of the form shewn in Figure 2, the carrying out of the method of making the material is effected by first taking two lamina of cloth or cloth and soft material, such as *c* and *d*, and putting the teeth *a* into and through them; then arranging such lamina a distance apart on the teeth: and then pouring molten metal or hard substance in between said lamina round about the teeth and allowing it to cool. Or, the teeth may be first put into the material *c* (which forms a support for them), then run in the molten metal, and then put the teeth through the upper lamina *d*. The carrying out of the method of making material as shewn in Figure 4 is the same as this method, except that the lamina *d* is not employed.

In the carrying out of the method of making material as shewn in Figure 5, the teeth are first held at their tips (*i.e.* their outer ends in a plate or body with holes therein of suitable size and pitch; or in a modified way they are held at their other ends by putting them through a thin layer of paper or other equivalent material of sufficient depth and strength to support them in the desired way), and then molten metal or hard substance is run in and about their bases and allowed to set. The holding material in the latter case may be removed by tearing or burning it away if desired.

I would remark here that the invention is not confined to the particular manners or method herein set forth of making the material, or to the different substances employed for supporting the teeth when the molten metal or hard substance is being poured round them.

By this invention there is provided a carding material (or material or articles of an analogous nature for other purposes than carding) of a great rigidity and strength, and far more rigid and stronger than anything hitherto produced.

It enables this class of toothed or pointed material to be used for purposes and under conditions which heretofore has failed through lack of rigidity and strength.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim is :—

1. The herein described toothed or pointed material or article of manufacture, the same comprising teeth *a* disposed closely together, and a backing *b* of suitable metal or hard material, cast round and about such teeth at or near the base thereof.

2. The herein described toothed or pointed material or article of manufacture, the same comprising wire teeth *a*, disposed closely together, a backing *b* of suitable metal or hard substance cast round and about said teeth and by which they are held, and a soft material such as textile material or paper.

3. The toothed or pointed materials constructed or made as set forth with reference to Figure 1; Figure 2; Figure 3; Figure 4; and Figure 5, respectively.

4. Hand files or rasps constructed substantially as herein set forth.

5. The hand files or rasps set forth with reference to Figures 7 and 8 of the drawings.

Dated this First day of December 1891.

CHEESBROUGH & ROYSTON, Fels. Chart. Inst. P.A.,
15, Water Street, Liverpool, Applicant's Patent Agents.

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